

**Claims**

1. An optical modulator, divided into at least two active segments separated by at least one passive segment, the modulator comprising:

- 5 - an optical waveguide with an optical group index ( $n_o$ ) having an optical signal propagating at an optical velocity ( $v_o$ ), and
- a microwave transmission line with an electrical propagation index ( $n_p$ ), having an electrical signal propagating at an electrical velocity ( $v_e$ ),

10 wherein the electrical propagation index ( $n_p$ ) of the unloaded microwave transmission line is lower than the optical group index ( $n_o$ ) of the optical waveguide,

15 **characterized in** that the loading and length of the microwave transmission line are adjusted for a specific Bloch impedance and electrical velocity ( $v_e$ ).

2. An optical modulator according to claim 1,  
20 **characterized in** that the electrical velocity ( $v_e$ ) in the adjusted microwave transmission line is substantially equal to the optical velocity ( $v_o$ ) in the optical waveguide.

3. An optical modulator according to any of claims 1 or 2,  
25 **characterized in** that the length of the microwave transmission line from the center of one active segment to the center of the adjacent active segment is longer than the length of the corresponding optical waveguide from the center of one active segment to the center of the adjacent active segment.

4. An optical modulator according to any of claims 1 - 3,  
30 **characterized in** that the active segment of the optical modulator is a microwave transmission line and is cascaded in

series with the microwave transmission line of the passive segment.

5. An optical modulator according to any of claims 1 – 4, characterized in that the optical modulator is an electro-absorption modulator.

6. A method for adapting the impedance in an optical modulator which is divided into at least two active segments separated by at least one passive segment, wherein the modulator comprises:

- an optical waveguide with an optical group index ( $n_o$ ) having an optical signal propagating at an optical velocity ( $v_o$ ), and
  - a microwave transmission line with an electrical propagation index ( $n_p$ ), having an electrical signal propagating at an electrical velocity ( $V_e$ ),
- wherein the electrical propagation index ( $n_p$ ) of the unloaded microwave transmission line is lower than the optical group index ( $n_o$ ) of the optical waveguide, characterized by
- adjusting the loading and length of the microwave transmission line for a specific Bloch impedance and electrical velocity ( $V_e$ ).

7. A method according to claim 6, characterized by adjusting the loading and length of the microwave transmission line in such a way that the electrical velocity ( $V_e$ ) in the adjusted microwave transmission line becomes substantially equal to the optical velocity ( $v_o$ ) in the optical waveguide.

8. A method according to any of claims 6 or 7, characterized by adjusting the length of the microwave transmission line in such a way that the length from the center of one active segment to the center of the adjacent

active segment becomes longer than the length of the corresponding optical waveguide from the center of one active segment to the center of the adjacent active segment.

9. A method according to any of claims 6 - 8,  
5 **characterized by** implementing the active segment of the optical modulator as a microwave transmission line and cascading it in series with the microwave transmission line of the passive segment.

10. A method according to any of claims 6 - 9,  
10 **characterized by** the optical modulator being an electro-absorption modulator.